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USL Problem  
No. 1-151-00-00

U. S. NAVY UNDERWATER SOUND LABORATORY  
FORT TRUMBULL, NEW LONDON, CONNECTICUT

(6) THE SAVONIUS WATER CURRENT METER.

by

(10) George F. Carey

(9) USL Technical Memorandum No. 922-119-60

(11) 3 November 1960

LEVEL

On 4 August 1960 the author visited the David Taylor Model Basin for the purpose of calibrating five (5) Savonius water current meter rotors in the range of .1 to 1 knot.

The water current meters were developed for Project Artemis by Dr. Victor Anderson of the Marine Physical Laboratory of the Scripps Institution of Oceanography.

Figure 1 is a block diagram of the water current meter and its associated equipment. The details of the Savonius rotor are shown in figures 2 thru 4.

The wiring diagram (figure 5) shows that the transmitter consists of a 100 cycle oscillator which is transformer coupled to an amplifier. The Savonius rotor functions as a salt water switch which varies the coupling of the transformer thus it amplitude modulates the 100 cycle oscillator producing six pulses per second per revolution of the rotor.

Figure 6 is a copy of the calibration curves for rotors 1 thru 4 inclusive. This calibration was accomplished by a commercial concern for MPL in Convairs' tank in San Diego, California.

Figure 7 is the calibration curves for rotors 5 thru 9 inclusive. The data for these curves was taken by the author at DTMB on carriage No. 3.

Since the calibration curves group quite well, it would seem that an average curve could be drawn to be used by all future rotors without the necessity of calibration. The maximum variation of 17% from an average occurred at low speeds.

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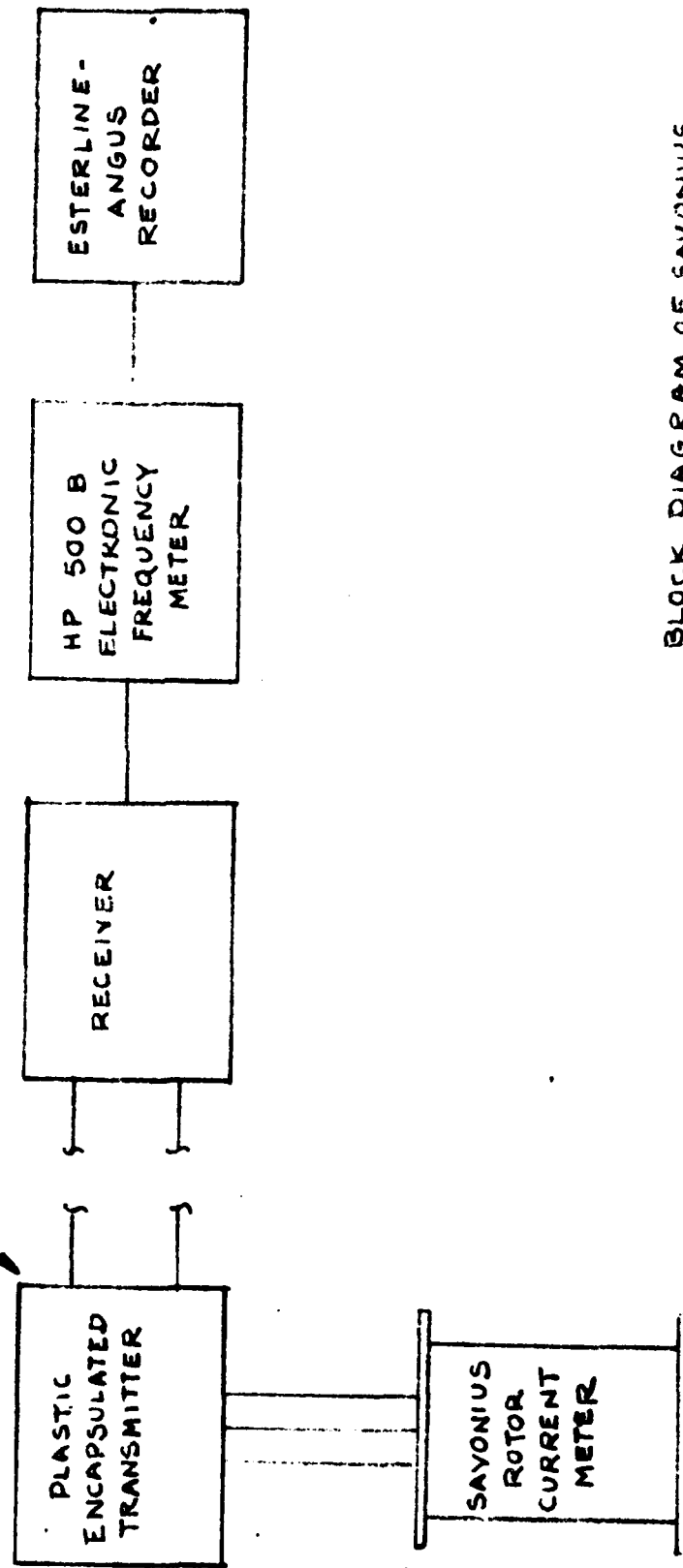
Caution should be exercised in such a procedure because of the possible occurrence of other rotors like No. 8 which produce erratic nonreproducible data.

*George F Carey*  
G. F. Carey  
Mechanical Engineer

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FOR WIRING DIAGRAM  
SEE FIGURE 5 (SK-37506)



BLOCK DIAGRAM OF SAYONIUS  
CURRENT METER & ASSOCIATED  
EQUIPMENT.

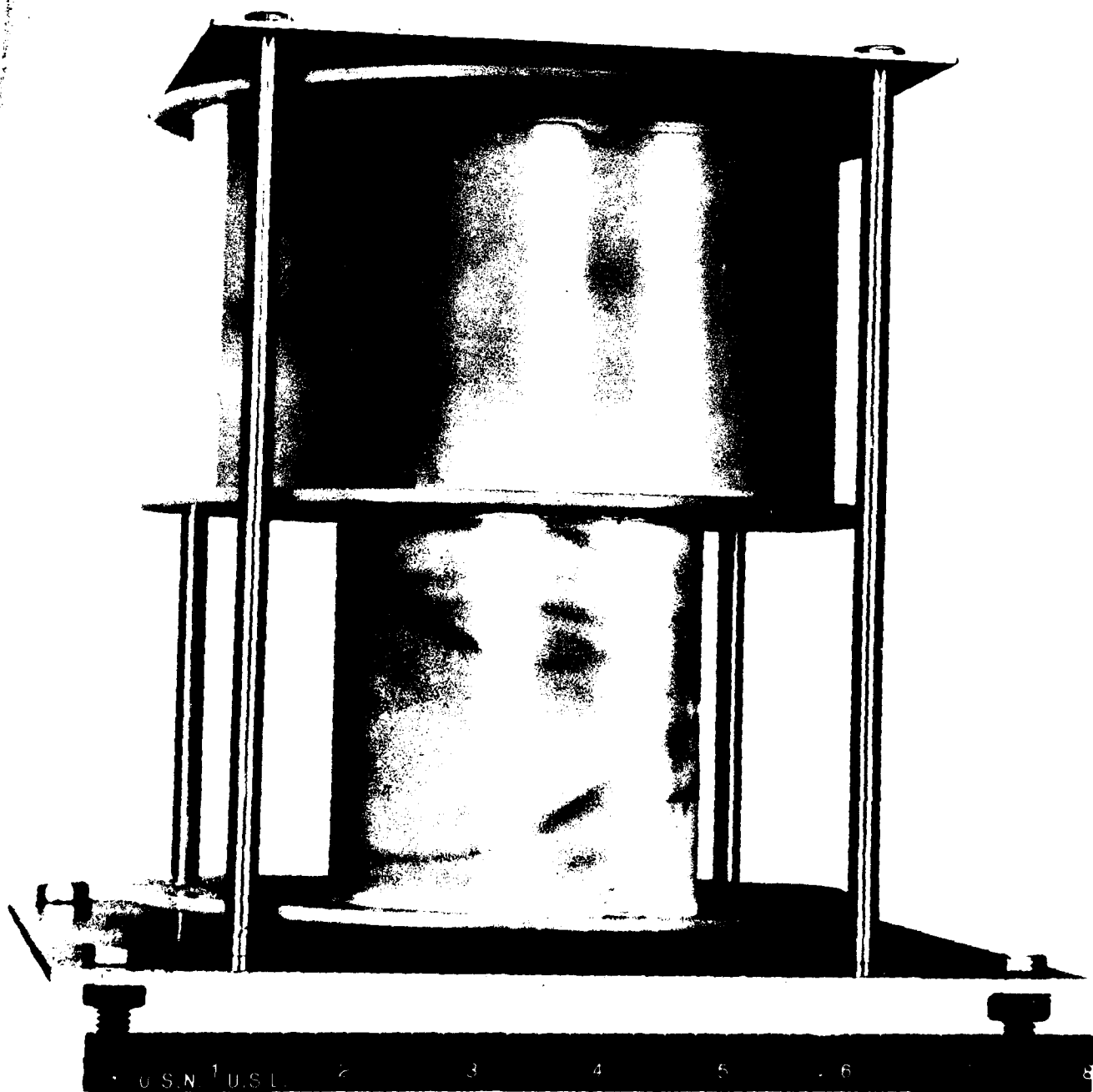


Fig. 2 - Plastic Savonius Rotor

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NP24 - 19450 - 10 - 60

Official Photograph

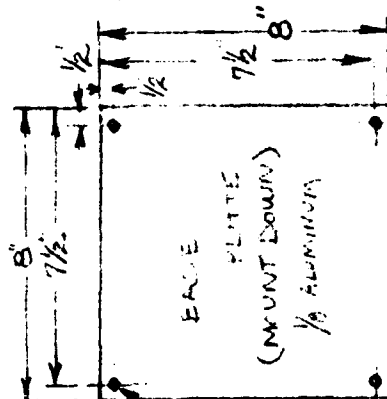
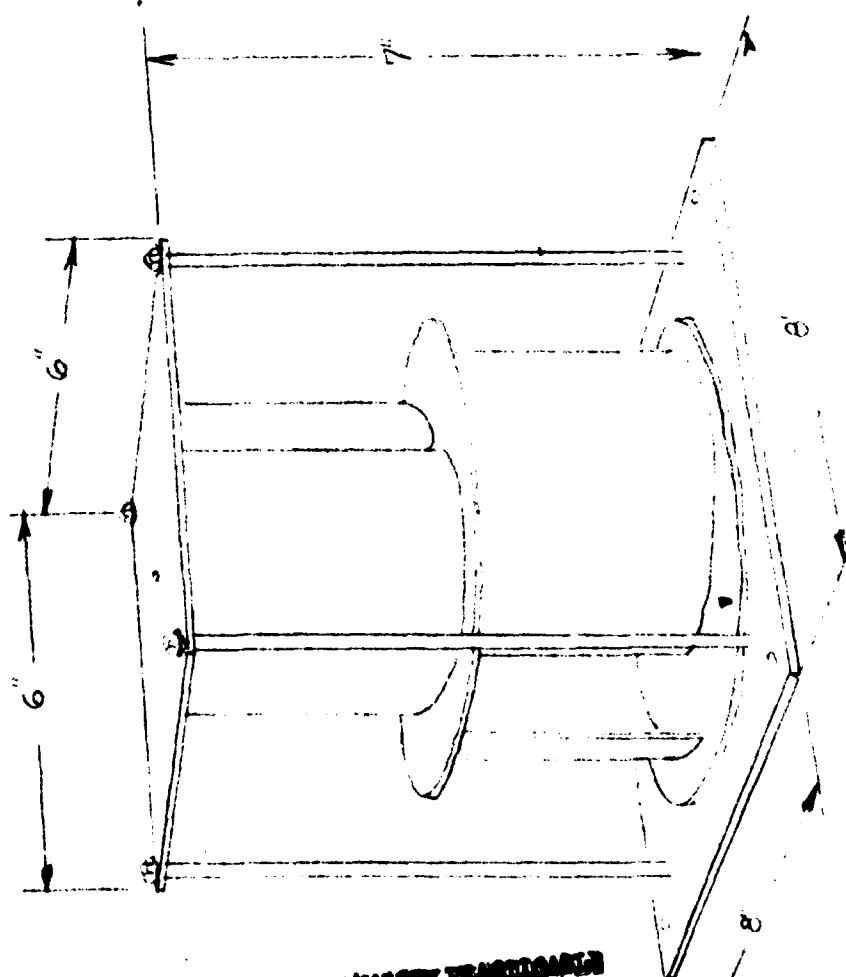


**Fig. 3 - Savonius Rotor Salt Water Switch**

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NP24 - 19451 - 10 - 60**

**Official Photograph**

REVISIONS		
NO.	DESCRIPTION	DATE
1	NOTE 1 MODIFIED	10/9/60



### NOTES:

1. MOUNT ROTOR WITH AXIS IN VERTICAL PLANE AND 8"x8" BASE DOWN
2. OVERALL DIMENSIONS ARE APPROXIMATE FOR CLEARANCE ONLY.

## FIGURE 4

U. S. NAVY UNDERWATER SOUND LABORATORY Fort Trumbull, New London, Connecticut			
CURRENT METERS ROTOR PLANE ASSEMBLY			
MATL	NO. REQD	ASSOC. NO.	
DATE 7/10/60	SCALE	JOB ORDER	
DATE 7/10/60	FINISH	DATE 10/9/60	
APPD			
DATE			SK- 37337

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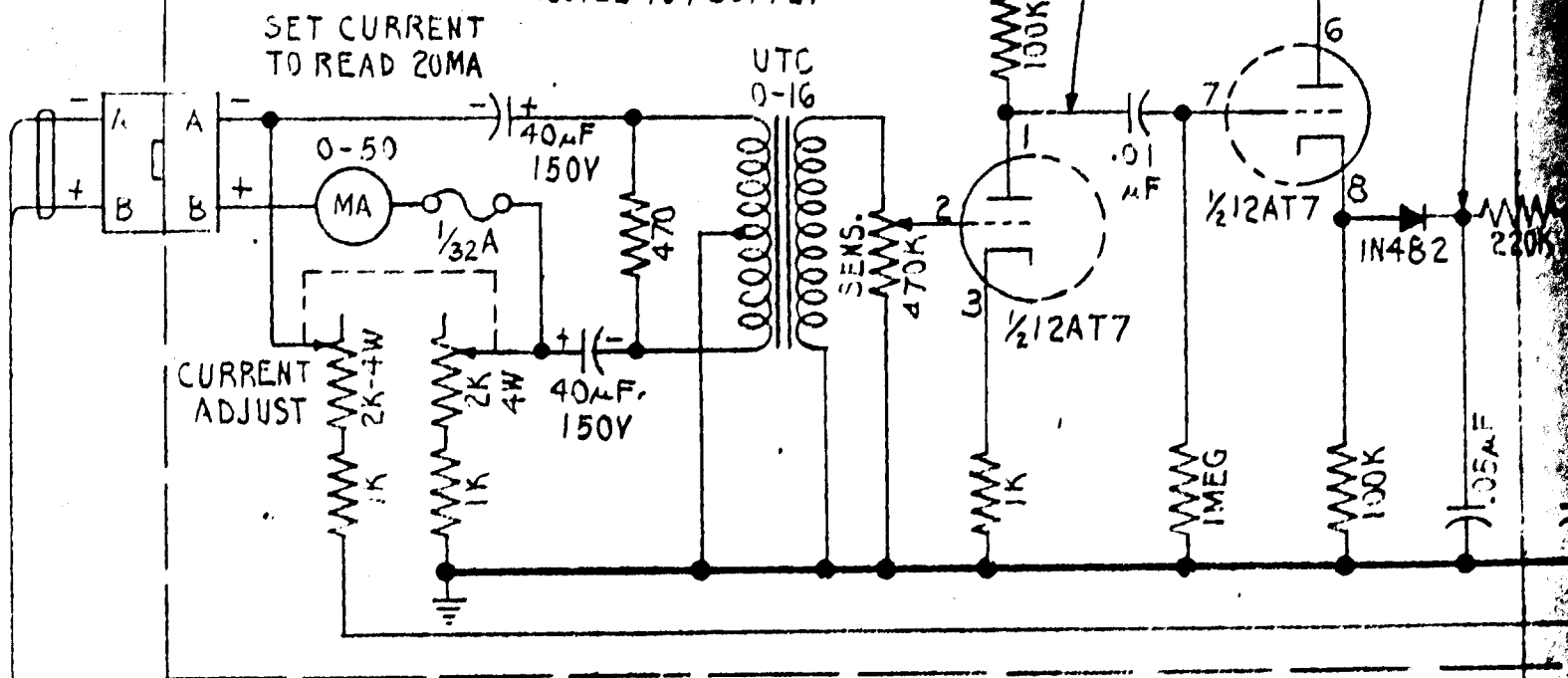
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2 FEET OF CUMULATIVE WIRE  
TO BASE  
3 1/8" TRANSMITTER  
POTED  
16 3/4" FAULT AIDE  
OUTPUT CUMULATIVE WIRE

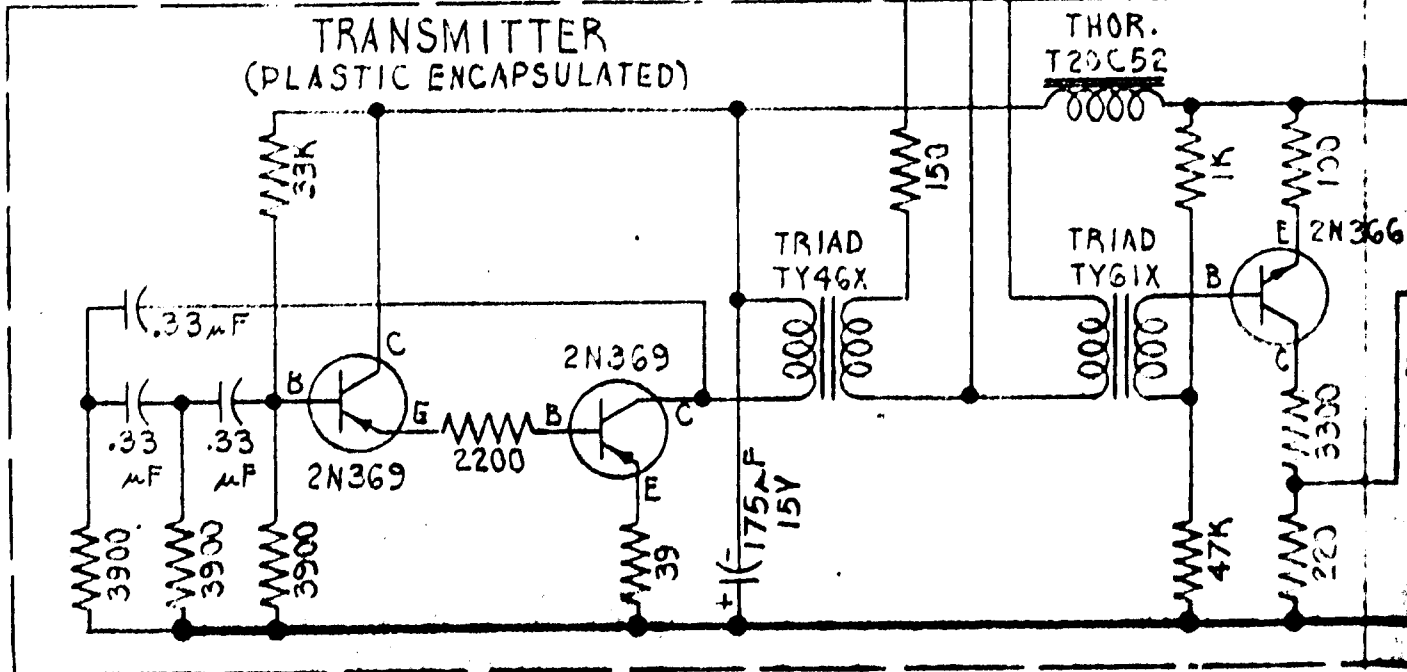
3RD-9890-11111  
3ND-USNUSL-23

10V P TO P MIN.

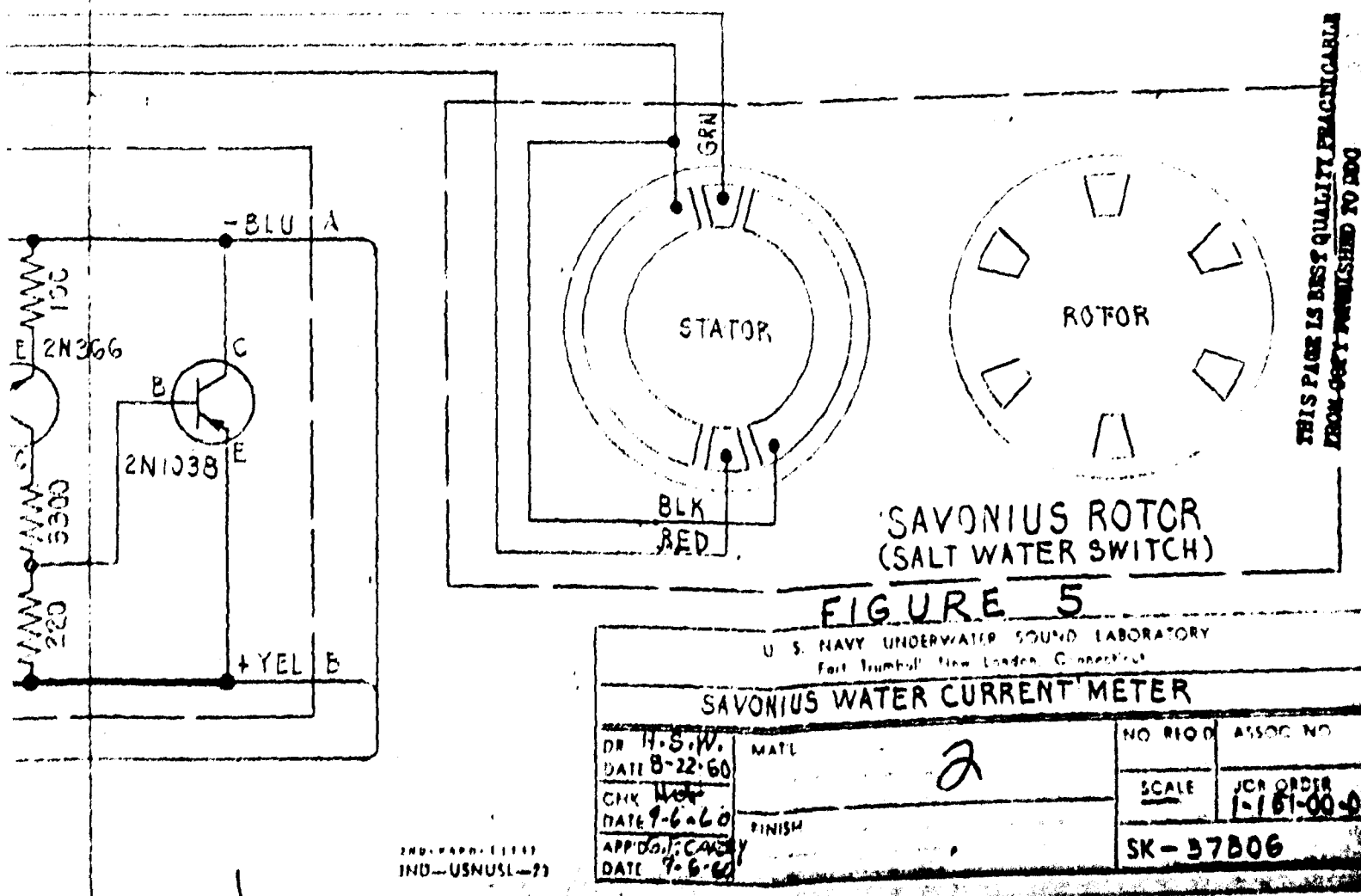
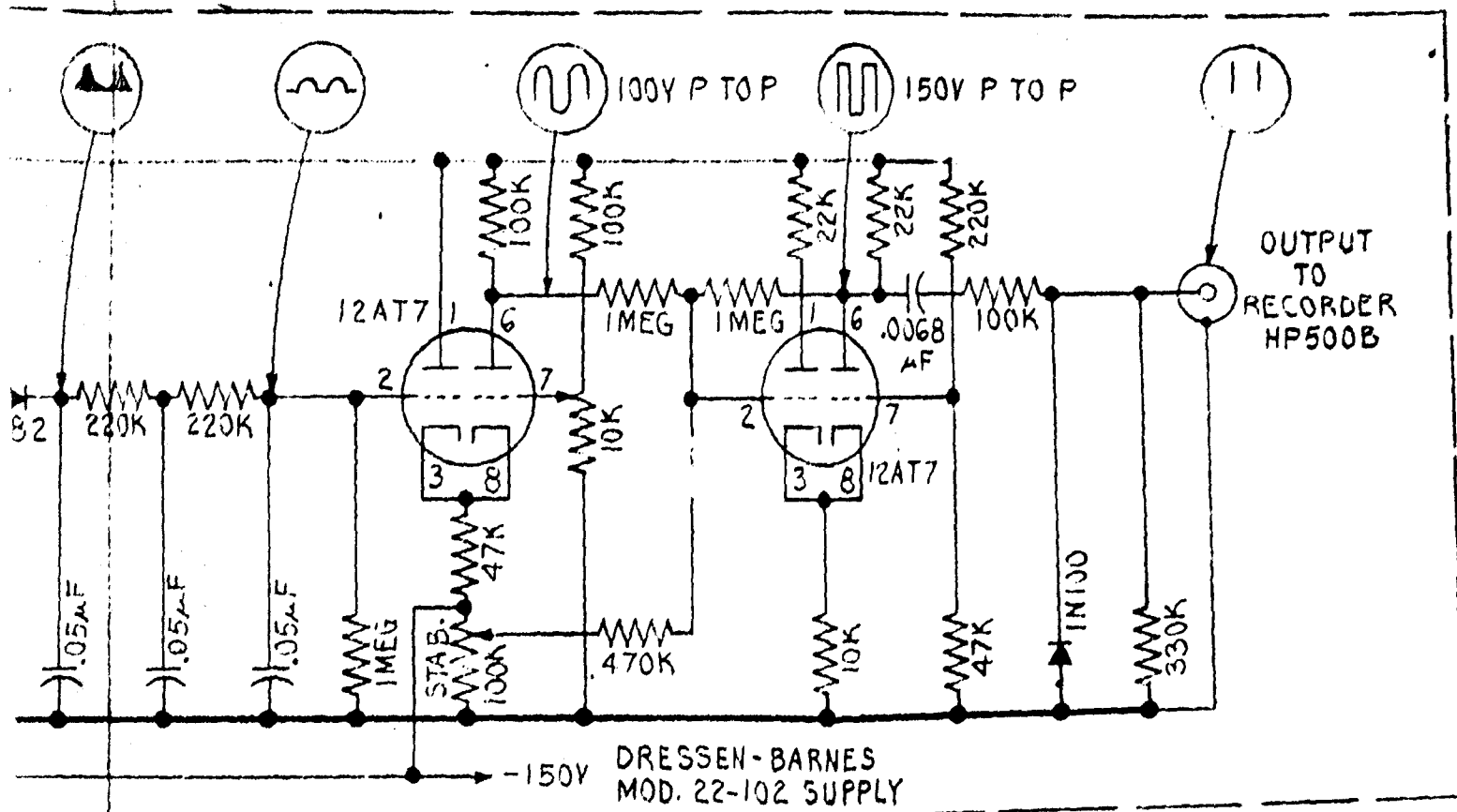
SET CURRENT  
TO READ 20MA



GRN	BLK	RED	
-----	-----	-----	--







MPL SAVENUS ROTOR  
 CURRENT METER

1 KNOT

.5 KNOT

.250 KNOT

.125 KNOT

.0625 KNOT

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NOTES: THIS IS A COPY OF  
 CURVES FURNISHED  
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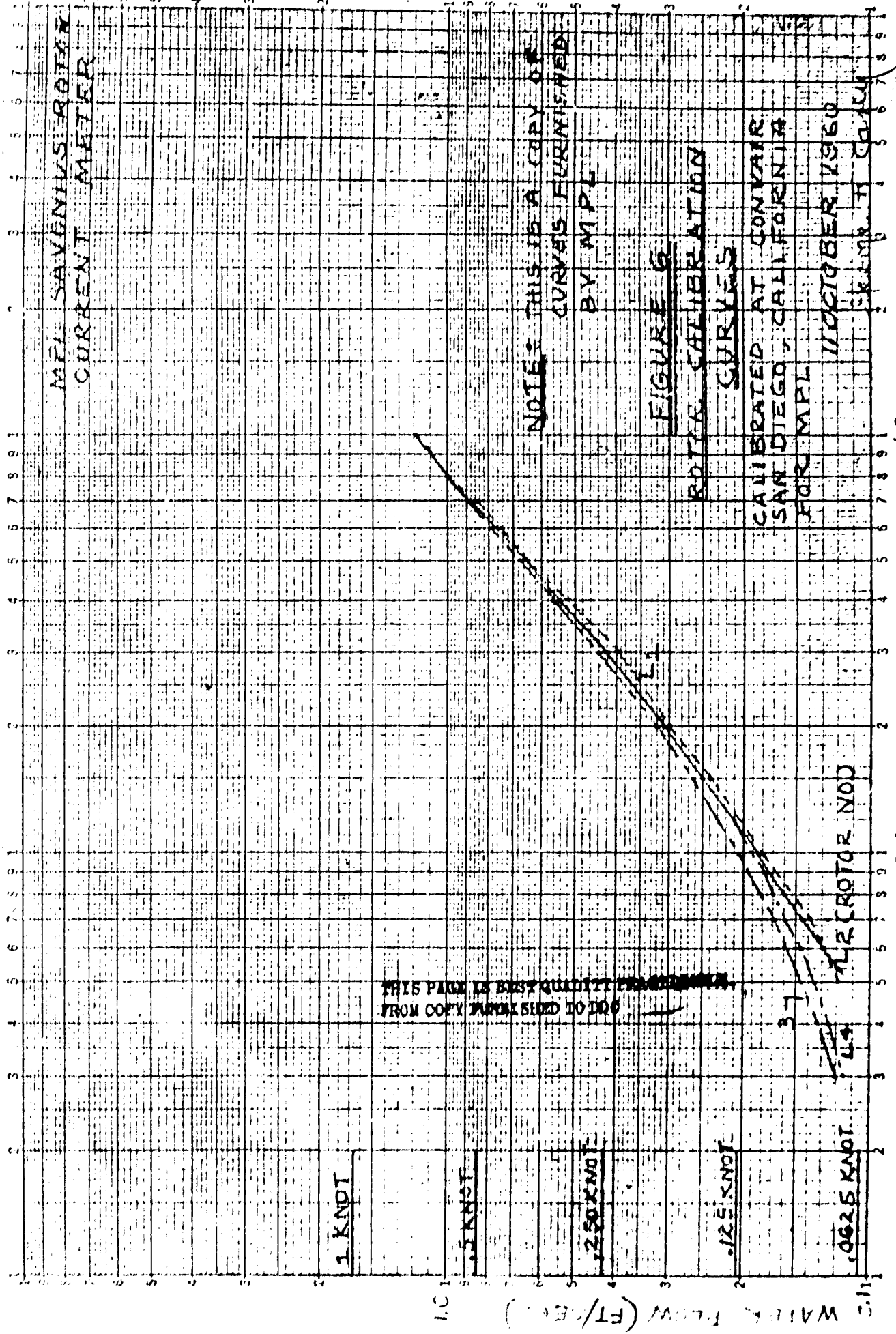
FIGURE 6  
 ROTOR CALIBRATION  
 CURVES

CALIBRATED AT COMNAV  
 SAN DIEGO, CALIFORNIA  
 FOR MPL

11 OCTOBER 1960

Skipped to copy

0.1 1.0  
 ROTOR (REVOLUTIONS/SECOND)



# MPI SAVONIUS ROTOR CURRENT METER

NOTE: NO. 3 ROTOR WAS NOT  
PLOTTED BECAUSE OF  
ERRATIC BEHAVIOR

1 KNOT

.5 KNOT

.250 KNOT

.125 KNOT

.0625 KNOT

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WATER FLOW (FT/SEC.)

FIGURE 7

## ROTOR CALIBRATION CURVES

CALIBRATION CURVES  
ON CARBON PAPER  
4 AUGUST 1960

1.0  
0.1

ROTOR (REVOLUTIONS/SECOND)